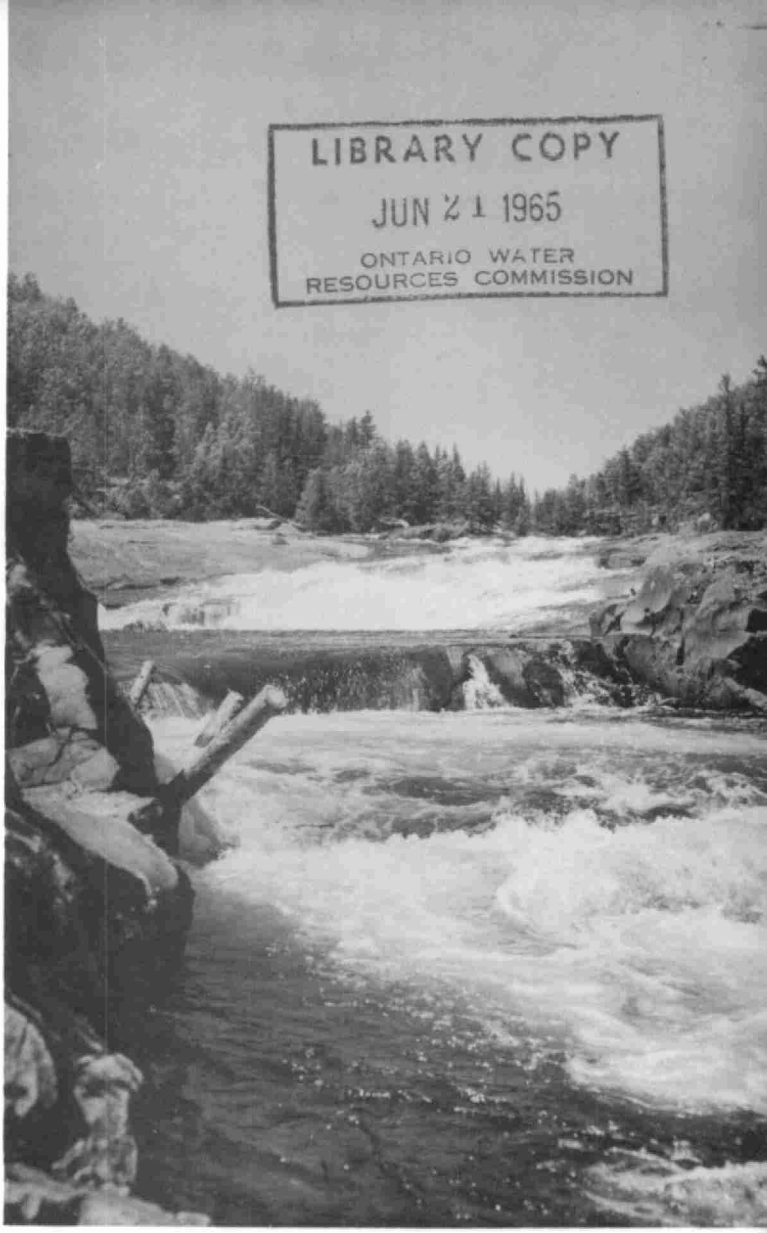
Georgetown Water Pollution Control Plant



1963 Annual Report

Ontario Water Resources Commission

ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Mayor and Members of Council,
Town of Georgetown.

Gentlemen:

I am pleased to submit, for your information, the 1963 Annual Operating Report of the Georgetown Water Pollution Control Plant, OWRC Project No. 58-S-17, which has been prepared by our Division of Plant Operations.

We are grateful for the kind cooperation which you and your staff have extended to our Operations staff throughout the year. We look forward to a continuing close association with you in our mutual endeavour to control pollution.

Yours very truly,

D. S. Caverly,
General Manager

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Georgetown Water Pollution Control Plant, OWRC Project No. 58-S-17 for 1963.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B C Palmer

B. C. Palmer,
Director,
Division of Plant Operations.

foreword

This report is designed to present the highlights of the operation of these works during 1963. Trends in flows and other operating data can be extremely useful in the development of necessary long range enlargement and improvement programs.

In addition to the activities reported herein, much unrecorded effort has contributed to the success of this operation. The municipality, through representatives on the Local Advisory Committee, have given valuable assistance in reviewing salary schedules, detailed operating budgets, personnel problems, flow patterns, and major maintenance problems.

The Division of Plant Operations has provided direction to the field staff in administrative procedures, quality control, maintenance schedules, equipment inspection and purchase supervision. A number of other Divisions of the Commission have been of service. The Division of Construction has offered helpful advice on equipment selection and renovation problems. The Division of Sanitary Engineering has maintained, through its District Engineering staff, a keen interest in the operation and has made a number of constructive recommendations. Its operator training courses have been very helpful. The Division of Finance has processed many payrolls, purchase orders and invoices dealing directly with this project. The Commission Personnel Director has been most helpful in the selection of new staff.

The excellent cooperation of all of these groups is gratefully acknowledged.

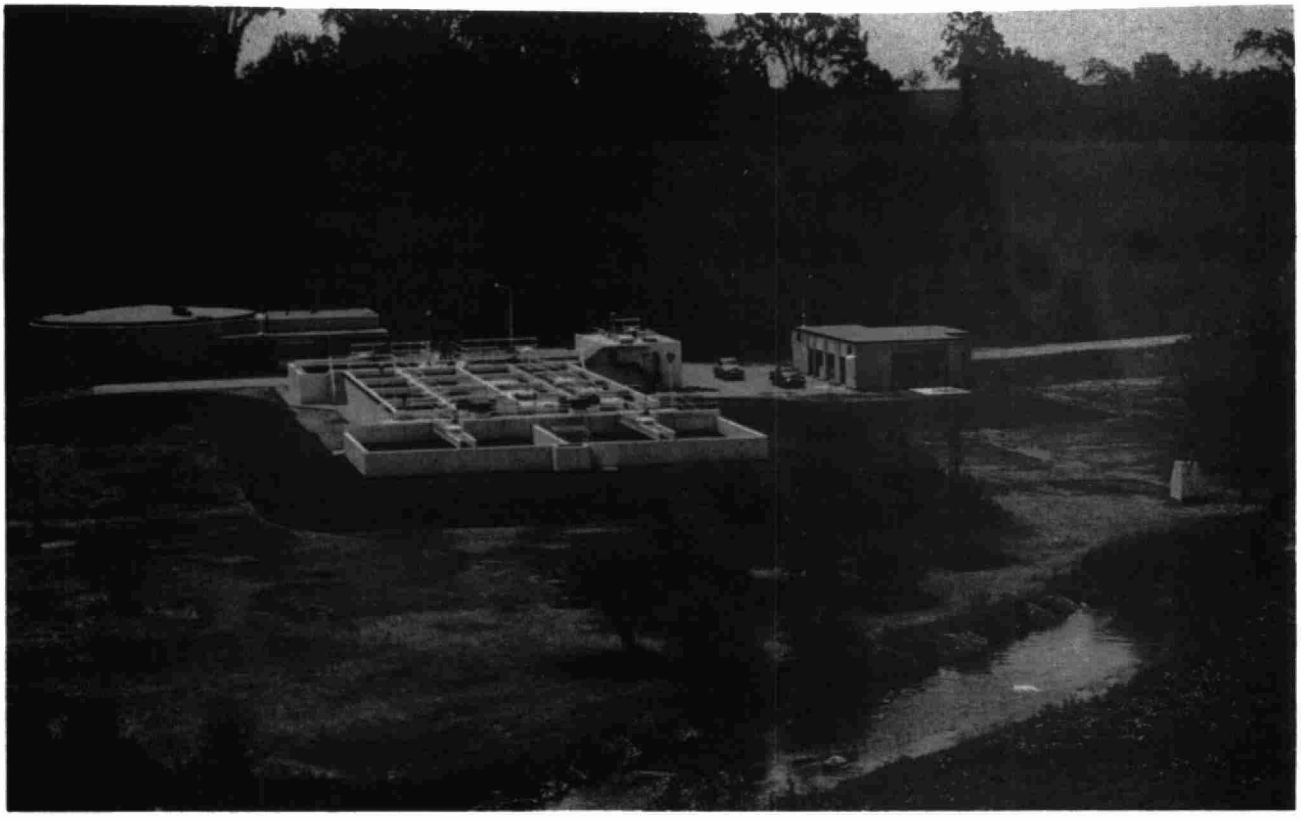
B. C. Palmer,
Director,
Division of Plant Operations

DIVISION OF PLANT OPERATIONS

contents

C. W. Perry
Assistant Director
D. McTavish
Regional Supervisor
B. G. Porter
Operations Engineer

GEORGETOWN WATER POLLUTION CONTROL PLANT



OPERATED FOR

THE TOWN OF GEORGETOWN

BY

THE ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN

A. M. Snider

COMMISSIONERS

W. D. Conklin, Q. C.
J. H. H. Root, M.P.P.
J. A. Vance, LL. D., P. Eng.
A. A. Wishart, Q. C., M.P.P.

GENERAL MANAGER

D. S. Caverly

ASSISTANT GENERAL MANAGERS

G. M. Galimbert
L. E. Owers

COMMISSION SECRETARY

W. S. MacDonnell

1957 to 1963 History

INCEPTION

On July 31, 1957, the Town of Georgetown, in cooperation with the Ontario Water Resources Commission, initiated plans for the construction of a modern water pollution control plant. The firm of Proctor & Redfern, Toronto, Ontario, Consulting Engineers, was engaged to prepare plans and specifications for the project.

APPROVAL

Ontario Municipal Board approval for this project was granted on July 15, 1958 and on August 6th, 1958, the town signed an agreement with the Ontario Water Resources Commission to finance, construct and operate the project.

CONSTRUCTION

The contract was awarded to Frid Construction Company of Hamilton, Ontario who began work in April, 1959. Construction was substantially completed in April 1961. Full scale operation was commenced in June of 1961.

TOTAL COST

$880,285.00.

Project Staff

F. W. Smith,
Chief Operator

Operators: R. A. Rolfe

A. W. Disson

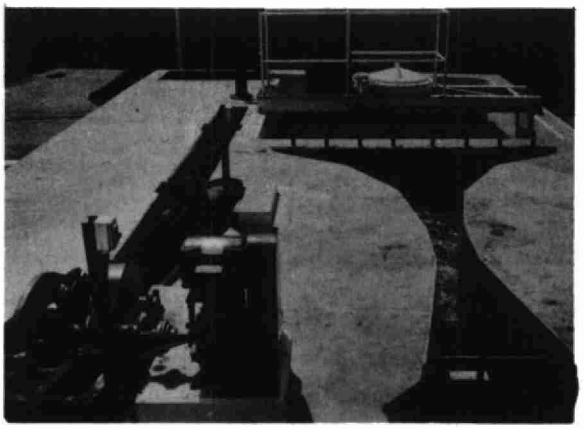
COMMENTS

The normal complement of staff consists of one Chief Operator and two operators. An operator was hired in June 1963 to bring the staff up to full strength.

During the week, Monday to Friday, the plant is staffed eight hours per day. Staff rotation provides four hours coverage per day on Saturday and Sunday.

Mr. Smith received his Certificate of Qualification as a sewage works operator in 1963 after successfully completing a series of three, one week duration, courses of instruction sponsored by the OWRC. Mr. Rolfe is currently enrolled in the course and successfully completed the first series of lectures in 1963.

Description of Project



INFLUENT WORKS

Sewage enters the plant via a trunk sewer and passes through coarse bar screens. A Chicago Pump Company barminutor screens and shreds the larger solids in the sewage. Flow measurements are continuously recorded from signals originating from the sewage passing through a 12 inch throat Parshall flume. Flow from the flume is received by a wet well.

Two Flomatcher controlled, variable speed, 50 HP sewage pumps lift the sewage to elevated grit removal facilities. Gravity flow through the remainder of the plant is realized.

Grit is removed by a Dorr Type WA detritor. The 12 foot square, flow-through tank is equipped with a raking mechanism to remove the settled grit.

PRIMARY CLARIFIERS

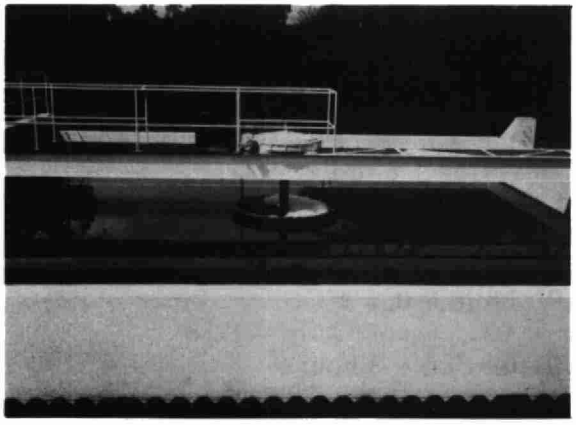
Two 35 ft. square x 10 ft. SWD concrete primary clarifier tanks receive gravity flow from the detritor. The tanks are equipped with a circular scraping mechanism to remove the sludge which settles to the bottom and a skimmer arm to remove the grease and floating solids. Sludge and scum are pumped to the primary digester. The retention time in the primary clarifiers, at design flow of 1.5 MGD, is 2.5 hours.

AERATION

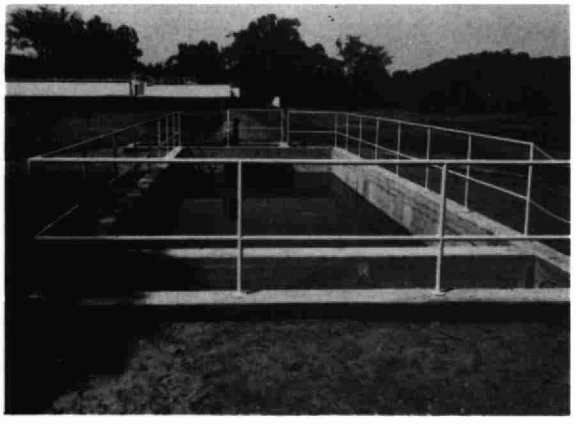
Primary effluent is mixed with return activated sludge and aerated in two 28 ft. x 112 ft. x 13.25 ft. deep, four cell mechanical aeration tanks. Air is supplied by eight Ames Crosta Simplex high intensity mechanical aerators. Oxygen transfer can be regulated by adjusting variable level effluent weirs. Adsorption and aerobic digestion of suspended and dissolved organic solids occurs due to the action of bacteria and enzymes in the mixed liquor. Aeration retention time is approximately 7.5 hours at design flow.

FINAL CLARIFIERS

Two 40 ft. square by 10 ft. SWD concrete clarifiers receive gravity flow from the aeration section. Activated sludge settles to the tank bottom where

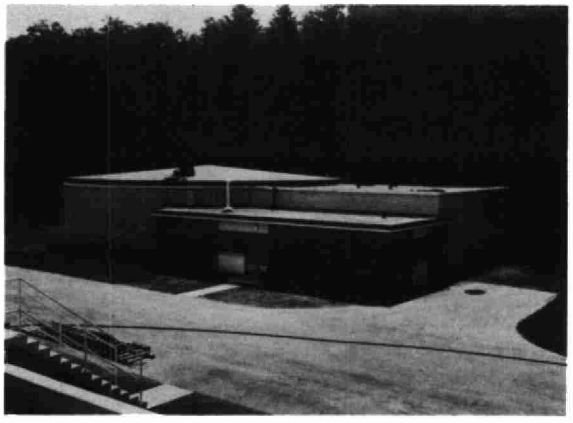


it is collected by a circular scraping mechanism. A portion of this sludge is returned to the aeration section and the remainder is wasted to the primary clarifiers. The clear liquid remaining in the clarifiers overflows a peripheral weir and is directed to the chlorine contact chamber.



CHLORINE CONTACT CHAMBER

The concrete chamber is located close to the Silver Creek. It measures 24 ft. x 15 ft. x 6 ft. deep and provides a retention time of 26 minutes at design flow. Chlorine is fed to this tank by a 1,000 pound per day capacity gas chlorinator located in the control building. The contact chamber is close coupled to a spillway outfall structure. The effluent is then directed to Silver Creek.



DIGESTION TANKS

A 66 ft. diameter primary digester equipped with three mechanical draft tube mixers receives all of the sludge from the plant. This unit has a capacity of 484,800 gallons. Anaerobic digestion of the sludge occurs converting volatile solids into water and methane gas. The gas produced is used to heat the digesters to the optimum digestion temperature.

A 34 ft. square conditioning tank, having 134,000 gallon capacity receives sludge by gravity from the primary digester. This tank is unheated and remains quiescent to allow stratification into a bottom layer of relatively clear supernatant.

Design—Data

GENERAL

Type of Plant - Activated sludge.

Design Population - 15,000 persons.

Design Plant Flow - 1.5 MGD.

Per Capita Flow - 100 gallons per day.

Five Day BOD -

Raw Sewage - 200 PPM

Removalq - 95%

Suspended Solids -

Raw Sewage - 200 PPM

Removal - 95%

PRIMARY TREATMENT

Screening

Coarse bar screens at 2.0 inch spacings.

Comminution

Chicago Pump Company 18 inch, Model C barminutor.

Sewage Lift Pumps

Two Chicago pumps each capable of 3500 USGPM at 60 ft. discharge head.

Grit Removal

12 ft. square Dorr Type WA detritor.

Primary Clarifiers

Dorr Type A.

35 ft. square x 10 ft. SWD.

Retention - 2.5 hours at design flow.

SECONDARY TREATMENT

Aeration Section

Ames Crosta Ltd. Simplex mechanical aeration - 8 units.

Size of tanks - 28 ft. x 112 ft. x 13.25 ft.

Volume - 0.5 MG.

Retention - 8 hours.

Final Sedimentation Tanks

Two Dorr Type AZ square tanks.

Size - 40 ft. x 40 ft. x 10 ft. SWD.

Volume - 100,000 gallons.

Retention - 3.2 hours.

Surface Settling Rate - 470 gallons per ft. per day.

Weir rate - 4,700 gallons per ft. per day.

Chlorine Contact Chamber

Size - 45 ft. x 15 ft. x 6 ft. deep.

Volume - 27,000 gallons.

Retention - 26 minutes.

Digestion Tank

Primary - 66 ft. diameter.

Volume - 77,800 cubic feet.

Dorr draft tube mixers - 3.

Secondary - 34 ft. square x 16.25 ft.

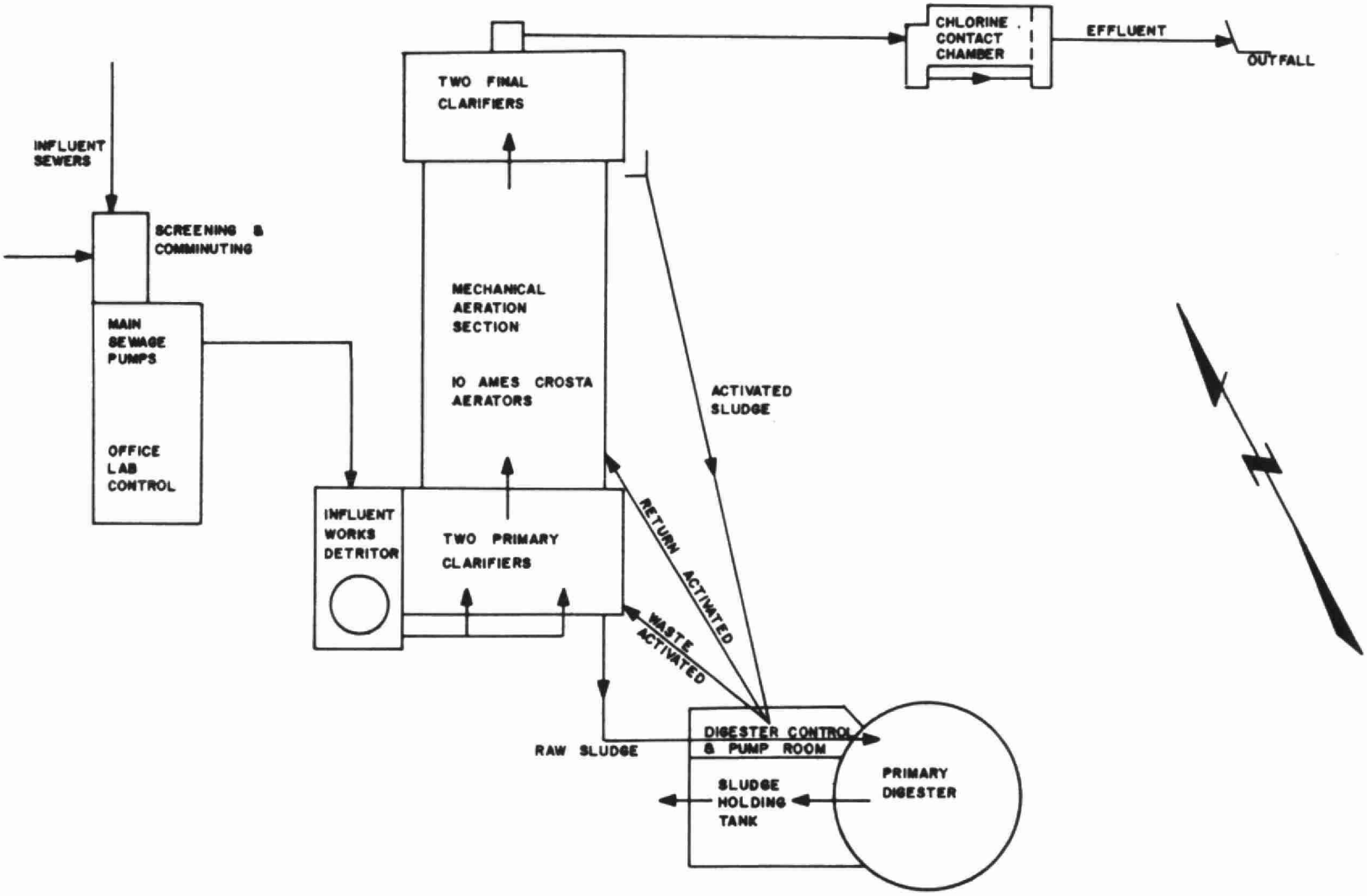
Volume - 20,700 cubic feet.

Sludge Disposal

Liquid sludge removal by tank truck.

GEORGETOWN S.T.P.

FLOW DIAGRAM

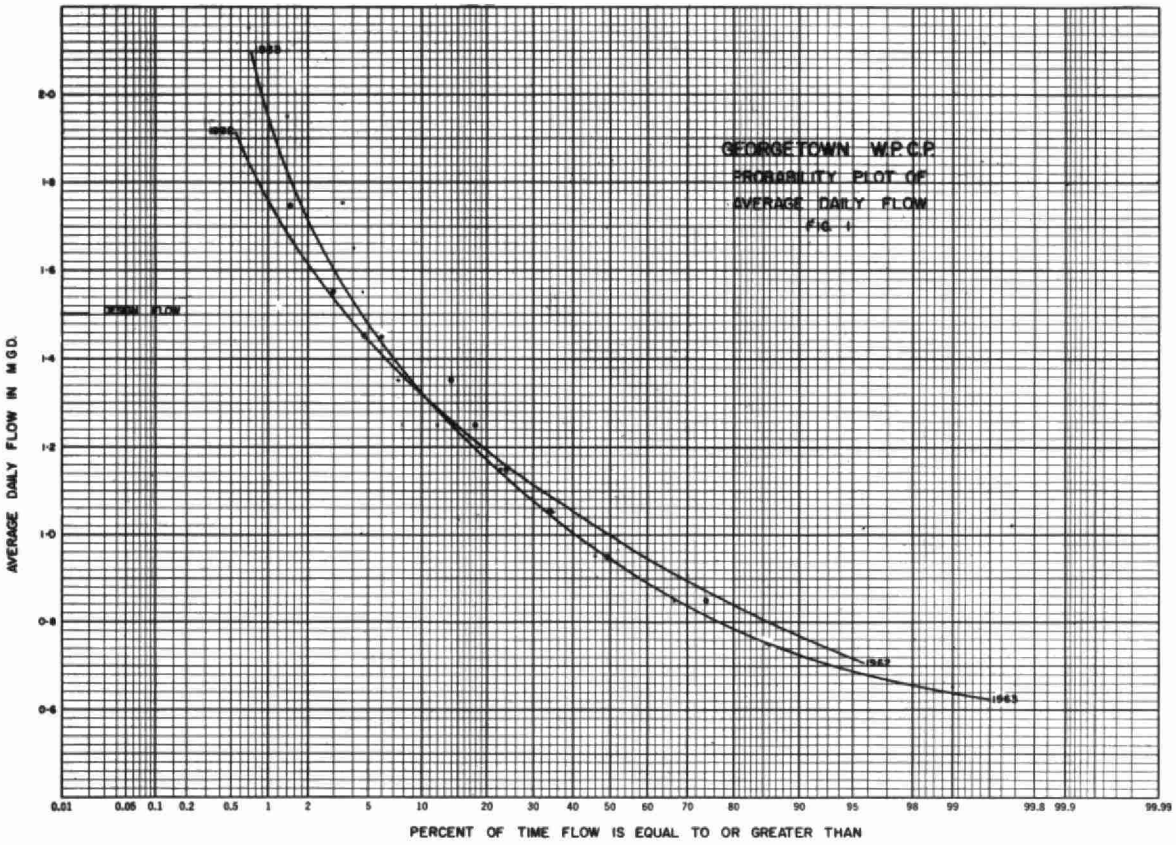


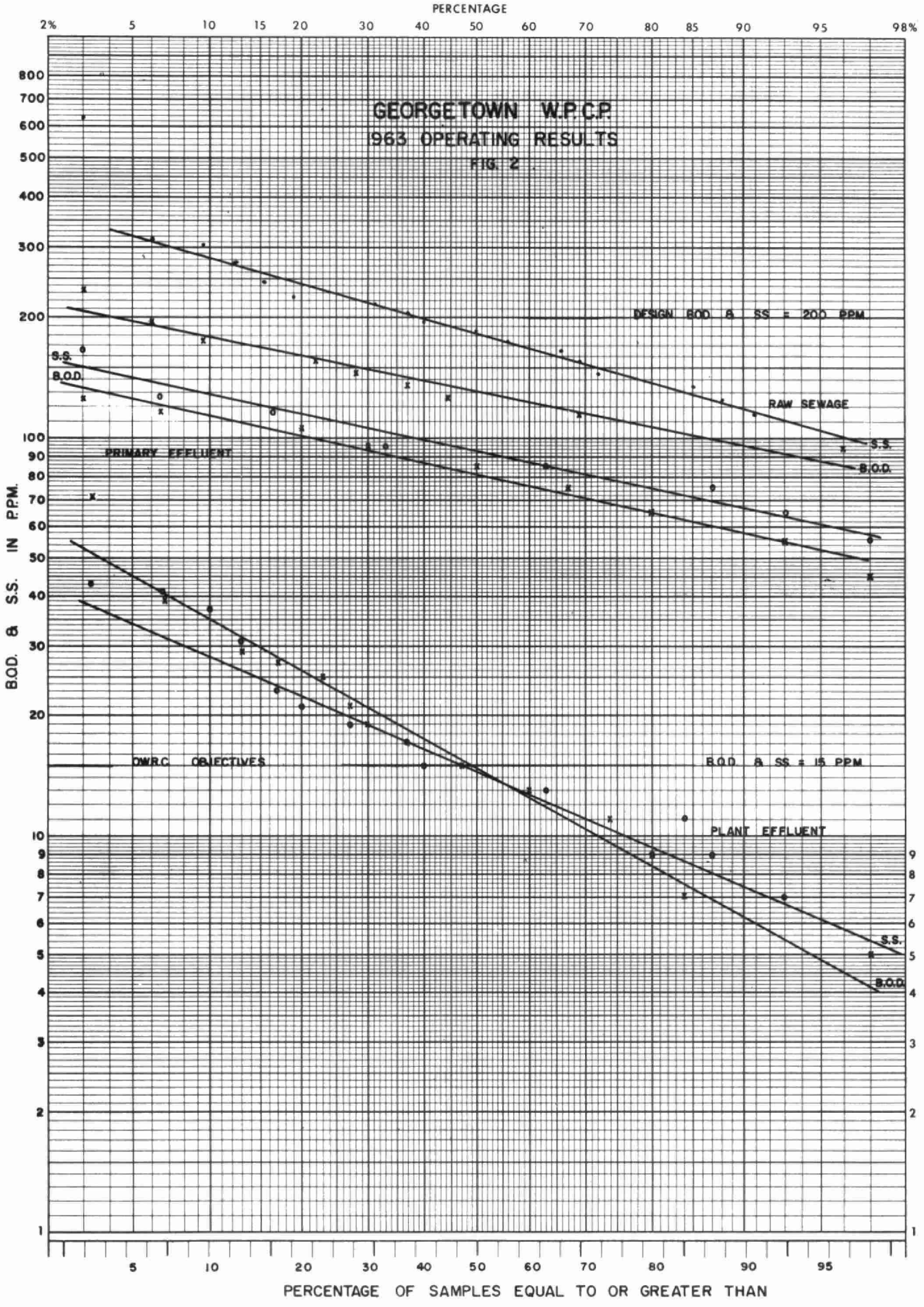
Process Data

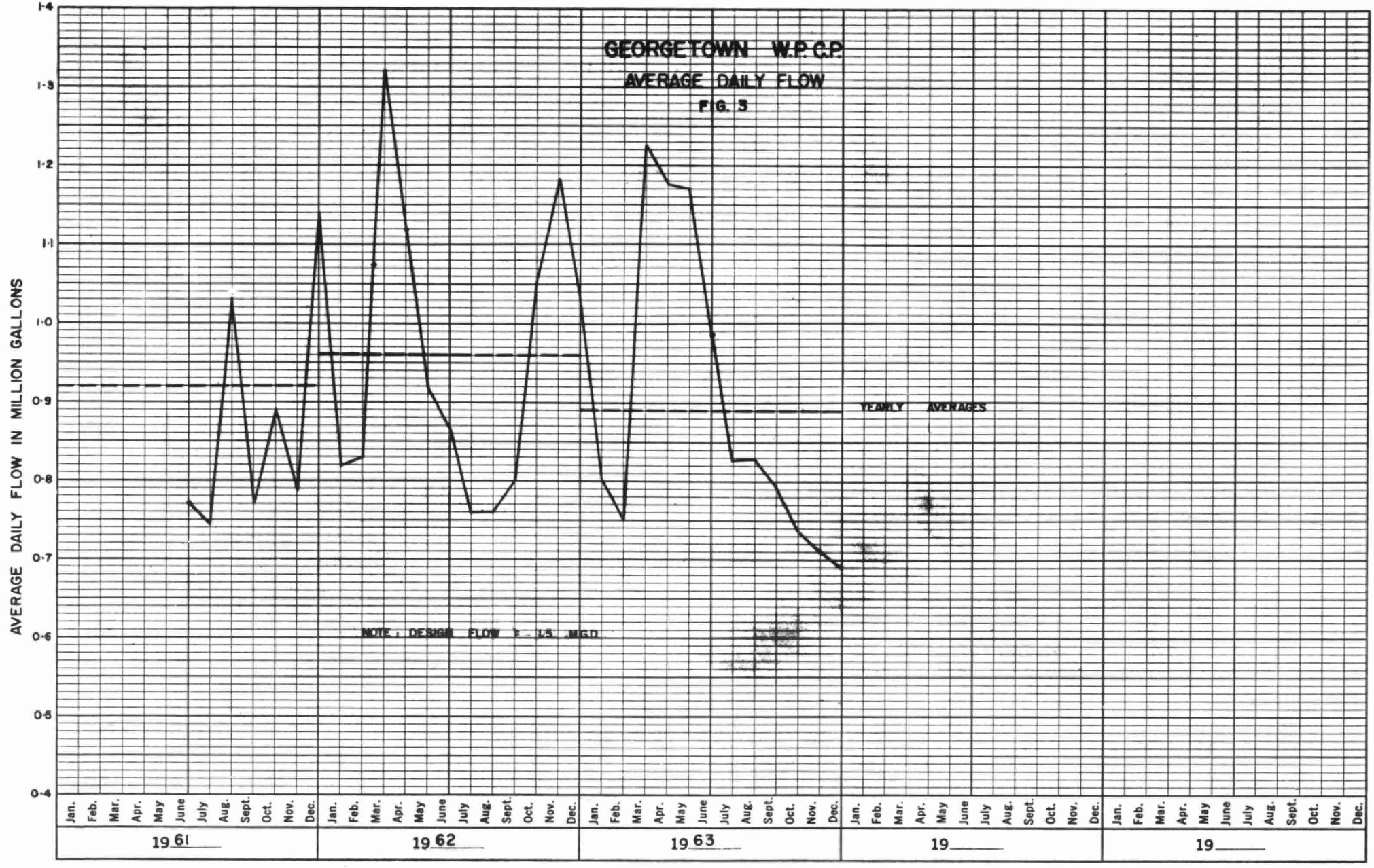
As will be noted from the accompanying charts and graphs, the average daily flow and total flow for the year were slightly less than the 1962 flows. During 1963, the average daily flow was 0.89 million gallons compared to 0.96 million gallons per day in 1962. This is a decrease of 8.3%. During the past year, 325.6 million gallons of raw sewage, a combination of both industrial and domestic wastes, received complete treatment.

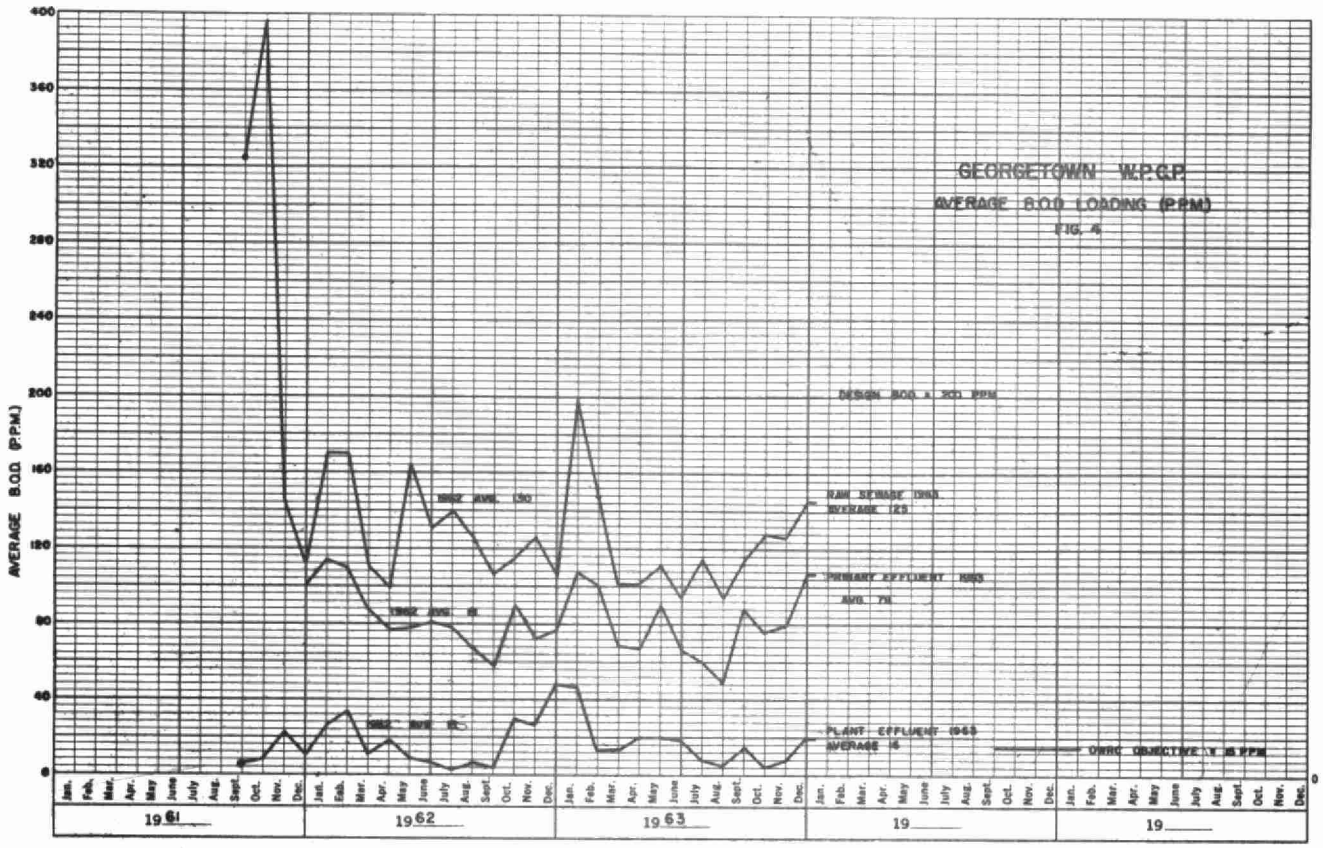
The maximum 24 hour flow was 2.28 million gallons with maximum and minimum flow rates of 3.60 and 0.02 million gallons per day.

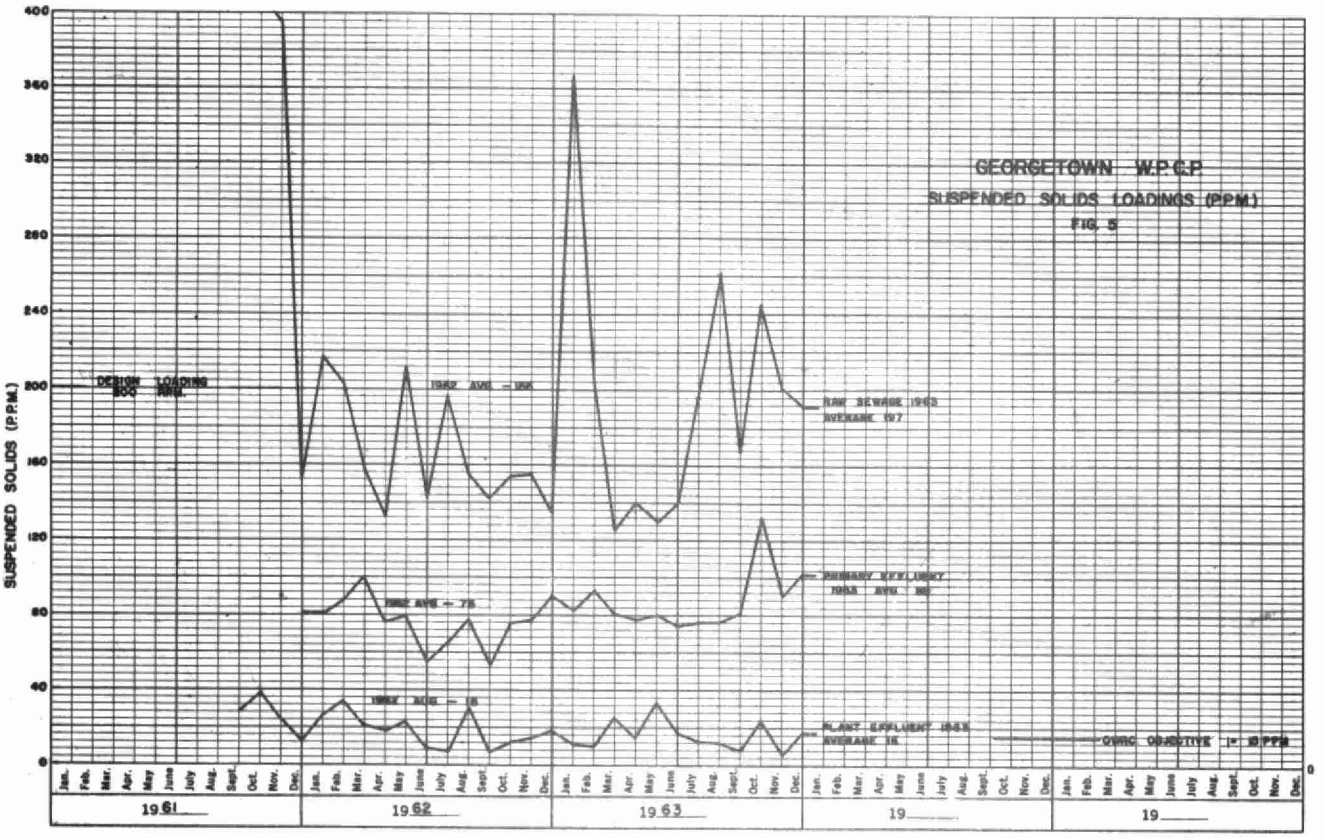
The following graphs and charts outline the quality and quantities of flow received at the Georgetown plant. The flow probability graph indicates that sudden large increases in flow can be expected for short durations during periods of higher than design flow.




PERCENTAGE
2%
5
10
15
20
30
40
50
60
70
80
85
90
95
98%
GEORGETOWN W.P.C.P.
1963 OPERATING RESULTS
FIG. 2
DESIGN BOD. & SS = 200 PPM.
RAW SEWAGE
S.S.
B.O.D.
PRIMARY EFFLUENT
O.W.R.C. OBJECTIVES
B.O.D. & SS = 15 PPM.
PLANT EFFLUENT
B.O.D. & S.S. IN P.P.M.
PERCENTAGE OF SAMPLES EQUAL TO OR GREATER THAN


GEORGETOWN W.P.C.P.
AVERAGE DAILY FLOW
FIG. 3
AVERAGE DAILY FLOW IN MILLION GALLONS
1·4
1·3
1·2
1·1
1·0
0·9
0·8
0·7
0·6
0·5
0·4
YEARLY AVERAGES
NOTE : DESIGN FLOW = 1.5 M.G.D.
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
19 61
19 62
19 63
19
19


GEORGETOWN W.P.C.P.
AVERAGE B.O.D. LOADING (P.P.M.)
FIG. 4
AVERAGE B.O.D. (P.P.M.)
DESIGN AVG. X 300 PPM
RAW SEWAGE 1963 AVERAGE 125
PRIMARY EFFLUENT 1963 AVG. 75%
PLANT EFFLUENT 1963 AVERAGE 16
OWRC OBJECTIVE - X 15 PPM
1962 AVG. 150
1962 AVG. 85
1962 AVG. 21
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
19 61
19 62
19 63
19
19

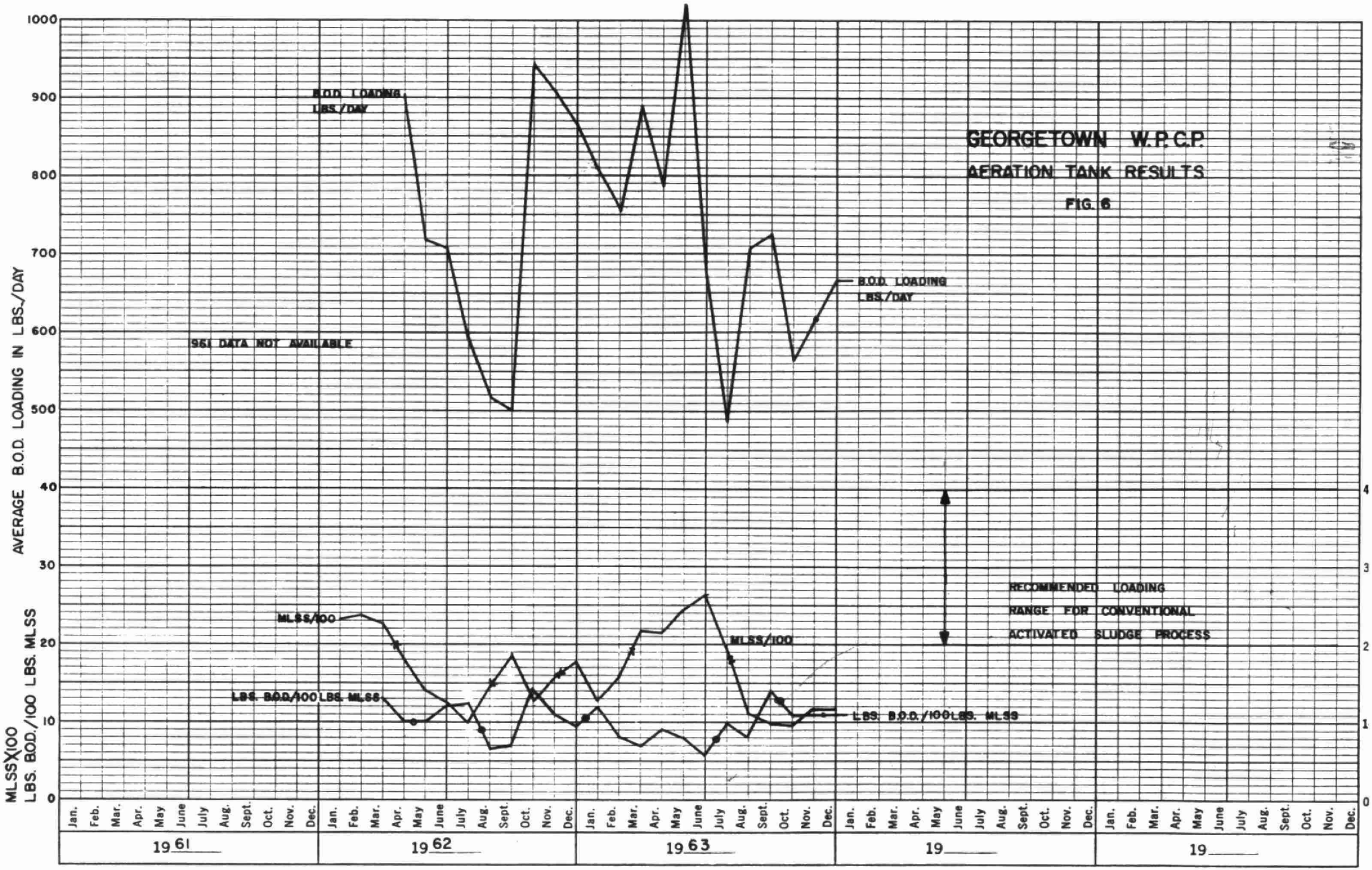

GEORGETOWN W.P.C.P.
SUSPENDED SOLIDS LOADINGS (P.P.M.)
FIG. 5
SUSPENDED SOLIDS (P.P.M.)
DESIGN LOADING 300 P.P.M.
1962 AVG. - 155
1962 AVG. - 75
1962 AVG. - 16
RAW SEWAGE 1963 AVERAGE 197
PRIMARY EFF. 1963 1963 AVG. 80
PLANT EFFLUENT 1963 AVERAGE 16
OWRC OBJECTIVE 15 PPM
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
19 61
19 62
19 63
19
19

GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	198	46	77	18.8	366	11	97	44.1	70
FEB.	147	13	91	14.1	203	10	95	20.3	41
MAR.	104	13	88	17.3	125	26	79	18.9	77
APR.	104	20	81	14.8	140	14	90	22.2	108
MAY	111	20	82	16.5	130	33	75	17.6	40
JUNE	95	18	81	11.3	140	17	88	18.1	34
JULY	115	8	93	13.7	195	12	94	23.0	18
AUG.	106	5	95	-	262	12	96	-	45
SEPT.	115	14	88	12.0	168	8	95	19.0	44
OCT.	128	4	97	14.2	248	24	91	25.6	17
NOV.	126	8	94	12.6	201	6	97	20.7	43
DEC.	155	19	88	14.5	191	17	91	18.6	38
TOTAL				159.8				248.1	941
AVG.	125	16	88	14.5	197	16	91	22.5	78

COMMENTS

The average BOD and suspended solids loadings are less than the plant design loadings. The effluent contains an average suspended solids of 16 PPM and an average BOD of 16 PPM. It is normally during periods when flows greater than the design flow are received that the effluent quality does not meet the Commission objective of 15 PPM BOD and 15 PPM suspended solids.


GEORGETOWN W.P.C.P.
AERATION TANK RESULTS
FIG. 6
AVERAGE B.O.D. LOADING IN LBS./DAY
MLSSX100
LBS. BOD./100 LBS. MLSS
B.O.D. LOADING LBS./DAY
1961 DATA NOT AVAILABLE
B.O.D. LOADING LBS./DAY
MLSS/100
LBS. BOD/100 LBS. MLSS
MLSS/100
LBS. B.O.D./100 LBS. MLSS
RECOMMENDED LOADING RANGE FOR CONVENTIONAL ACTIVATED SLUDGE PROCESS
1000
900
800
700
600
500
40
30
20
10
0
4
3
2
1
0
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
19 61
19 62
19 63
19

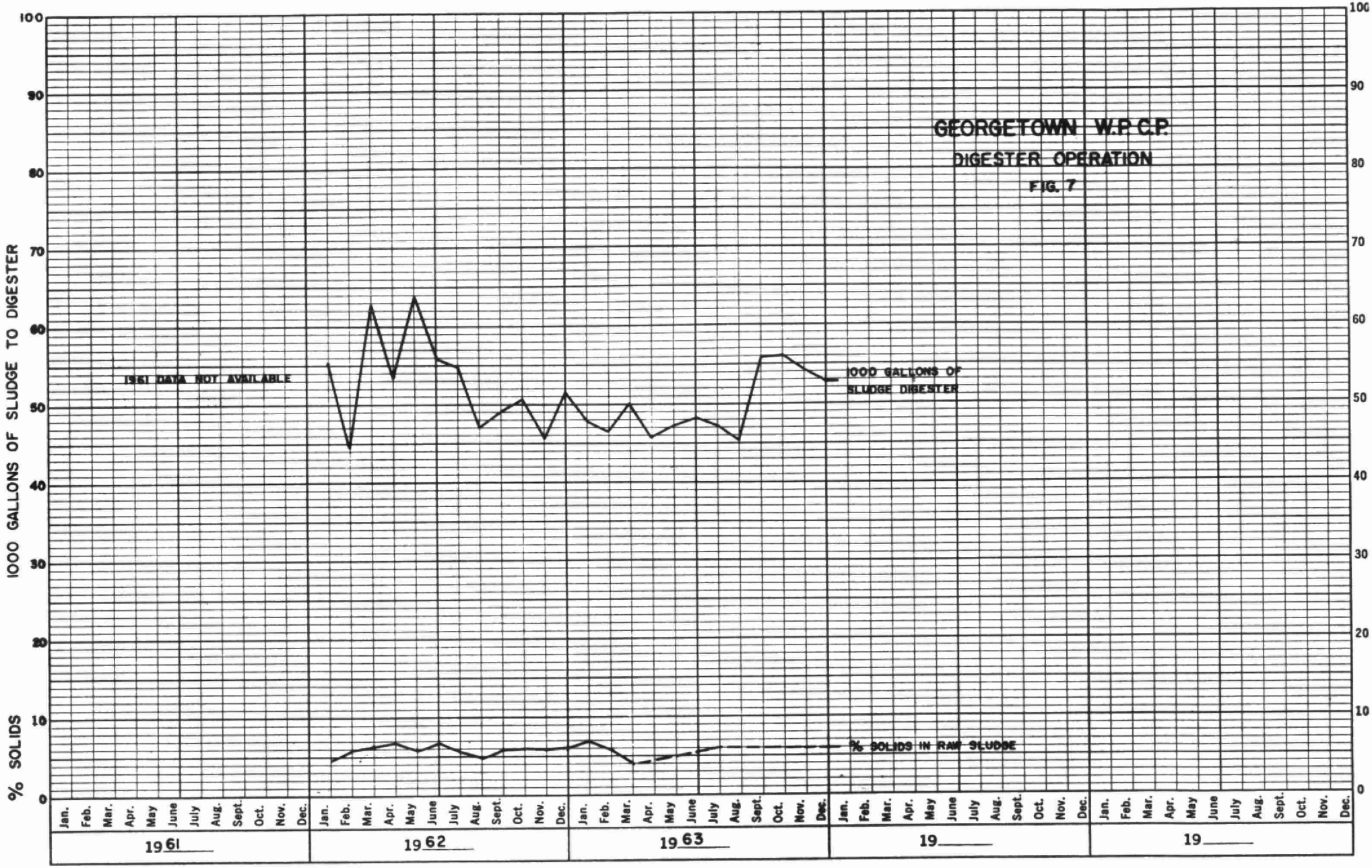
AERATION SECTION

MONTH	PRIM. EFFL. B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. B.O.D. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	107	1288	12	M
FEBRUARY	102	1585	8	E
MARCH	69	2174	7	C
APRIL	67	2163	9	H
MAY	90	2410	8	A
JUNE	66	2623	6	N A
JULY	60	1936	10	I E
AUGUST	49	1132	8	C R
SEPTEMBER	88	991	14	A A
OCTOBER	76	949	11	L T
NOVEMBER	80	1116	11	I
DECEMBER	97	1157	11	O
TOTAL				N
AVERAGE	79	1627	10	

* MLSS - MIXED LIQUOR SUSPENDED SOLIDS

COMMENTS

The only problem of note with the aeration section is caused by the incoming flow rates. Prior to spring breakup the flow rate of approximately 0.75 MGD would require operation of only one aeration tank. Both tanks must be kept in operation, however, and the MLSS must be maintained at a fairly high value to accommodate flows in the range of 2.0 MGD during spring breakup. This results in a poorer quality effluent during the early part of each year. The resulting average of 10 lbs. BOD per 100 lbs. MLSS is, therefore, lower than the recommended loading for aeration sections.


GEORGETOWN W.P.C.P.
DIGESTER OPERATION
FIG. 7
1000 GALLONS OF SLUDGE TO DIGESTER
% SOLIDS
1961 DATA NOT AVAILABLE
1000 GALLONS OF SLUDGE DIGESTER
% SOLIDS IN RAW SLUDGE
100
90
80
70
60
50
40
30
20
10
0
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1961
1962
1963
19____
19____

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			% VOL. MAT IN DIGESTED SLUDGE	GAS PRODUCED 1000'S CU. FT.	SLUDGE FROM DIGESTER 1000'S GALS
	1000'S GALLONS	% SOLIDS	% VOL. MAT. *			
JAN.	47.9	6.9	68			34.9
FEB.	46.5	5.8	71			18.7
MAR.	50.1	3.8	46	INFORMATION NOT AVAILABLE		9.6
APR.	45.7	-	-			73.8
MAY.	47.2	-	-			49.5
JUNE	48.0	-	-			22.1
JULY	47.2	5.8	67			60.3
AUG.	45.2	-	-			36.9
SEPT.	55.6	-	-			26.3
OCT.	55.9	-	-			59.6
NOV.	54.1	-	-			48.5
DEC.	52.7	-	-			34.7
TOTAL	596.1	-	-			474.9
AVG.	49.7	5.6	63			39.5

* VOL. MAT. - VOLATILE MATTER

COMMENTS

During the first half of 1963, digester gas was found to be escaping around the skirt of the digester roof, making it impossible to store gas for use in the furnace. This problem was corrected by modifications to the overflow from the primary to secondary digester. During the 1963-1964 winter months, digester gas was stored and used for heating.

Approximately 10,000 gallons of supernatant liquid are removed from the digester each month and the total solids in the digested sludge average about 4.5 percent.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	24.825	-	-
FEBRUARY	21.075	-	-
MARCH	38.070	-	-
APRIL	35.304	-	-
MAY	36.263	1154	3.28
JUNE	29.484	1181	4.00
JULY	25.586	1014	3.97
AUGUST	25.657	968	3.77
SEPTEMBER	23.785	1199	5.04
OCTOBER	22.860	917	4.01
NOVEMBER	21.314	670	3.15
DECEMBER	21.328 *	179	3.39
TOTAL	325.551	7282	-
AVERAGE	27.129	910	3.83

* NOTE: ONLY 5.28 M.G. CHLORINATED IN DECEMBER AS CHLORINATOR WAS OUT OF SERVICE FOR THREE WEEKS.

COMMENTS

During 1962, the chlorination period was from May 1st to September 31st. Chlorination of final effluent was initiated again on May 1st, 1963. Extensive surveys of the Credit River watershed were carried out during 1962 and 1963 by our Division of Sanitary Engineering and, in July of 1963, their recommendation was to continue chlorination for the entire year. Final effluent chlorination will be practiced in the future on a year-round basis.

1963

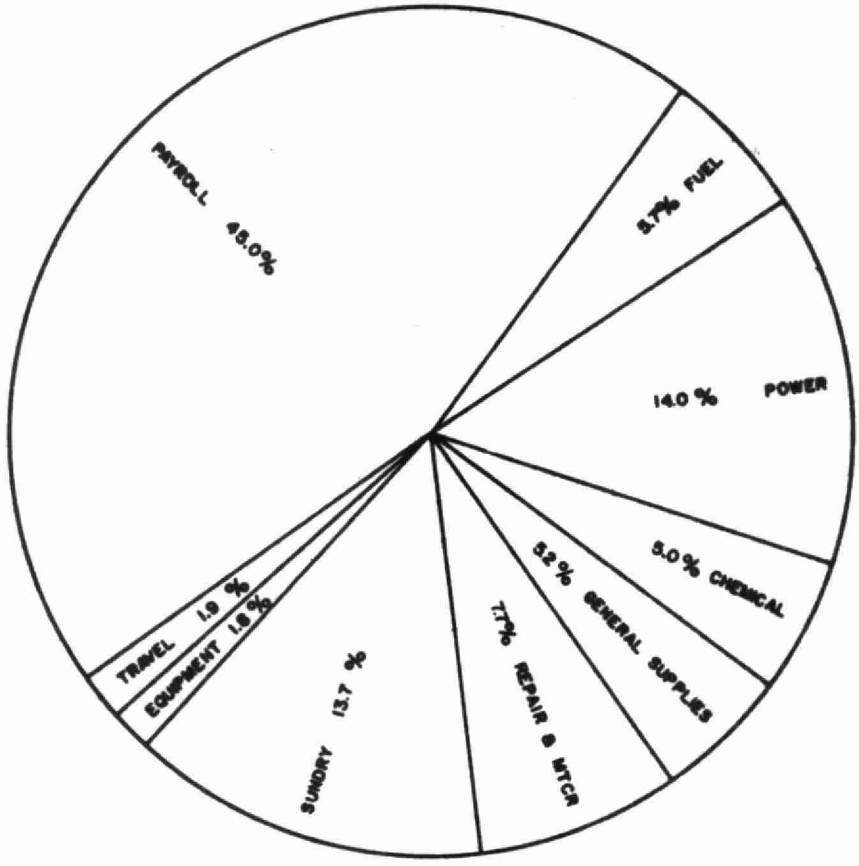
PLANT — **Total Operating Costs** — **MONTHLY**

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	TRAVEL
JAN	1554.35	772.16	-	168.66	-	-	26.27	112.06	-	445.50	29.70
FEB	1215.56	734.59	-	245.86	357.89	(525.00)	60.54	-	-	291.88	49.80
MARCH	1758.72	695.32	-	287.71	320.72	13.31	117.58	-	63.18	217.80	43.10
APRIL	1595.46	695.32	-	223.38	333.66	-	121.00	-	-	185.10	37.00
MAY	2477.71	790.20	-	130.23	335.89	574.03	9.50	-	24.26	565.43	48.17
JUNE	1998.76	899.11	-	108.77	357.57	-	178.30	-	52.10	361.44	41.47
JULY	2259.88	1686.53	-	58.98	338.17	-	93.21	34.90	11.25	21.14	15.70
AUG	2553.51	1025.64	-	45.99	305.24	798.06	130.98	-	12.70	201.10	33.80
SEPT	2375.26	978.93	-	-	295.58	-	338.87	-	354.24	372.74	34.90
OCT	2397.97	1025.64	-	120.74	327.20	259.02	192.16	-	68.19	360.82	44.20
NOV	2601.38	1034.56	-	54.75	308.49	-	(42.39)	-	1195.97	14.50	35.50
DEC	3908.22	1579.88	-	57.67	532.82	224.03	161.35	287.07	269.05	612.02	84.33
TOTAL	26694.78	11917.88	-	1502.74	3813.23	1343.45	1387.37	434.03	2050.94	3628.00	497.67

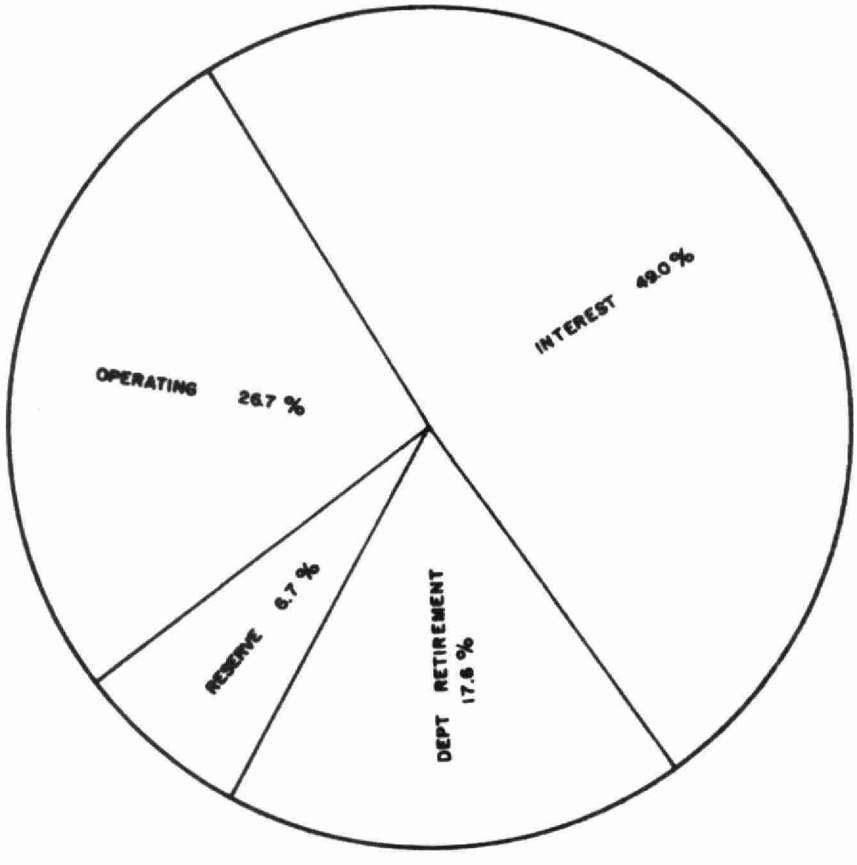
PLANT — **YEARLY**

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER CAPITA PER YEAR	COST PER TON OF BOD REMOVED
1961	1961 DATA NOT AVAILABLE				
1962	351.410	22,842.71	$65.00	$2.14	$119.00
1963	325.551	26,694.78	$81.63	$2.49	$163.00
	POPULATION - 10,678 FROM 1963 MUNICIPAL DIRECTORY				

1963 OPERATING COSTS



TOTAL ANNUAL COSTS



SUMMARY

This report has given in detail significant data on the operation of the various treatment units at the Georgetown Water Pollution Control Plant.

With an average daily flow of 0.89 million gallons per day, the plant is well below its full treatment capacity of 1.5 million gallons per day. The annual flow is expected to increase with the growth and development of the Town of Georgetown.

The annual operating costs have continued to increase due to increased cost of labour, supplies and to increased maintenance. The treatment costs of $81.63 per million gallons is considered fairly economical.

Under the constant supervision of head office engineers, the plant staff has maintained a clean, attractive and efficient plant for the Town of Georgetown. A special emphasis is placed on public relations and the aesthetic qualities of the plant.

Total 1963 Costs

The total cost to the municipality during 1963 was as follows:

Operating	$ 26,694.78
Debt Retirement	$ 17,627.00
Reserve	$ 6,876.00
Interest	$ 49,021.60
TOTAL	$ 100,219.38

Note: The amount in the Reserve Account as of December 31, 1963 was $ 18,785.06.

On the basis of [illegible] 78, the total annual cost [illegible] Plant was approximate

Division of Plant Operations

ONTARIO WATER RESOURCES COMMISSION
801 BAY ST. TORONTO 5